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10/717,279	11/19/2003	Steven J. Koester	YOR920030533US1 (17110)	7401
23389 7590 11/26/2008 SCULLY SCOTT MURPHY & PRESSER, PC 400 GARDEN CITY PLAZA SUITE 300 GARDEN CITY, NY 11530				
EXAMINER				
MAL ANH D				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/717,279

**Applicant(s)**

KOESTER, STEVEN J.

**Examiner**

Anh D. Mai

**Art Unit**

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 July 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2 and 4-21 is/are pending in the application.  
4a) Of the above claim(s) 10-21 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1,2 and 4-9 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/5508)  
Paper No(s)/Mail Date \_\_\_\_\_  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 31, 2008 has been entered.

### ***Status of the Claims***

2. The Amendments filed July 21 and 31, 2008 are acknowledged. Claim 9 has been amended. Non-elected invention, claims 10-21 have been withdrawn. Claims 1, 2 and 4-21 are pending. Action on merits of claims 1, 2 and 4-9 follows.

### ***Declaration***

3. The Declaration filed on July 30, 2008 under 37 CFR 1.131 has been considered but is ineffective to overcome the Xiang (US Patent No. 6,849,527) reference.

4. The evidence submitted is insufficient to establish a conception of the invention prior to the effective date of the Xiang '527 reference. While conception is the mental part of the inventive act, it must be capable of proof, such as by demonstrative evidence or by a complete disclosure to another. Conception is more than a vague idea of how to solve a problem. The requisite means themselves and their interaction must also be comprehended. See *Mergenthaler v. Scudder*, 1897 C.D. 724, 81 O.G. 1417 (D.C. Cir. 1897). The **Main Idea** of the Declaration

*does not recognize* the effect of carbon (C) nor tin (Sn) nor lead (Pb) in the strain layer and the performance of the device, utilizing these elements, as a whole. At most, the concept only deals with the formation of well implant consisting of high mass atom (e.g. In for p-well, or Sb for n-well), which is well known in the CMOS technology.

The Declaration also fails to show the claimed limitations, neutral species Pb, Sn and C, which the Applicant allegedly discovered prior to the Xiang '527 reference.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 7-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The independent claim 1 recites: blocking impurity dopant materials selected from the group comprising: **In, Pb, Sb and Sn**.

Claims 7 and 8 recite: "wherein said blocking impurity is a neutral-type impurity" and "wherein said blocking impurity is a group IV impurity", respectively.

The limitations of claims 7 and 8 are broader than that of claim 1, because, the "neutral-type impurity" and "group IV impurity" comprise more, much more, elements than the few elements claimed in claim 1.

Claims 7 and 8 fail to further limit claim 1. Therefore, claims 7 and 8 are indefinite.

Claim 9 recites: transistor device *as claimed in Claim 1*, wherein said blocking impurity dopant comprises **C singly or in combination with said Sn or Pb**.

Which means the limitation of claim 9 is broader than claim 1 by adding C in to the previously claimed of only four elements of the blocking impurity dopant. Therefore, claim 9 fails to further limit but rather contradicting claim 1, thus claim 9 is indefinite.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 7-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Xiang (US Patent No. 6,849,527) of record.

As best understood by Examiner, Xiang teaches a semiconductor field-effect transistor device substantially as claimed including:

a first strained layer (42) of semiconductor material doped of a first dopant type formed on a substrate (40);

a source region and a drain region (64) implanted with dopants of a second opposite type;

a gate electrode (54) separated from the first layer (42) by a dielectric region (56), and positioned between the source and drain regions (64);

substrate (40) having one or more threading dislocations, misfit dislocations or crystal defects that extends continuously from the source region to the drain region (64) at the interface between the first strained layer (42) of semiconductor material and substrate (40), and

blocking impurity dopant materials comprises **a neutral-type impurity** (claim 7); **a group IV impurity** (claim 8); **C** (claim 9), that partially or fully occupies each one or more threading dislocations, misfit dislocation or crystal defects along the interface, wherein the blocking impurity dopant materials substantially inhibit diffusion of the implanted source and drain dopants from diffusing along the threading dislocations, misfit dislocations or crystal defect (185) along the interface. (See Fig. 3i).

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 2 and 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiang (U.S. Patent No. 6,749,527) in view of Noda et al. (U.S. Patent No. 6,432,802) all of record.

With respect to claim 1, Xiang teaches a semiconductor field-effect transistor device substantially as claimed including:

a first strained layer (42) of semiconductor material doped of a first dopant type formed on a substrate (40);

a source region and a drain region (64) implanted with dopants of a second opposite type;  
a gate electrode (54) separated from the first layer (42) by a dielectric region (56), and  
positioned between the source and drain regions (64);

substrate (40) having one or more threading dislocations, misfit dislocations or crystal defects that extends continuously from the source region to the drain region (64) at the interface between the first strained layer (42) of semiconductor material and substrate (40), and

blocking impurity dopant materials that partially or fully occupies each one or more threading dislocations, misfit dislocation or crystal defects along the interface, wherein the blocking impurity dopant materials substantially inhibit diffusion of the implanted source and drain dopants from diffusing along the threading dislocations, misfit dislocations or crystal defect (185) along the interface. (See Fig. 3i).

The blocking impurity dopant material of Xiang comprises carbon, a neutral-type impurity and device of Xiang further includes halo regions to suppress short channel punchthrough.

Thus, Xiang is shown to teach all the features of the claim with the exception of explicitly utilizing In, Pb, Sb and Sn for the blocking impurity dopant materials.

However, Noda teaches that it is well known in the art to form the halo region to block the encroachment of the source and drain dopants into the channel region utilizing indium (In) and antimony (Sb).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to form the halo blocking region of Xiang utilizing In or Sb blocking

impurity as taught by Noda to prevent diffusion of the source/drain dopants into the channel region.

Regarding the threading dislocations, misfit dislocation or crystal defects, the dislocations or defects are inherent of the formation of strained layer (Si) on a relaxed layer (SiGe). (See AAPA).

With respect to claim 2, the first strained layer (42) of semiconductor material of Xiang comprises material selected from the group comprising Si.

With respect to claim 4, the semiconductor substrate (40) of Xiang includes a SiGe relaxed substrate.

With respect to claim 5 and 6, the device of Xiang includes NMOS and PMOS, where P, As or Sb singly or in combination are well known dopants for NMOS and B or In singly or in combination are well known dopants for PMOS. In view of Noda, blocking impurity of In or Sb are used for NMOS and PMOS, respectively, to prevent diffusion of the source/drain dopants into the channel region.

With respect to claim 7, the blocking impurity of Xiang is a neutral-type impurity.

With respect to claim 8, the blocking impurity of Xiang is a group IV impurity.

With respect to claim 9, the blocking impurity of Xiang is C.



***Response to Arguments***

8. Applicant's arguments filed July 31, 2008 have been fully considered but they are not persuasive.

Regarding the Declaration, as discussed above, the Declaration is not effective to overcome the Xiang '527 reference, see above.

In response to applicant's argument that Xiang only teaches use of Carbon impurity implanted in a device active region for purpose of enhancing carrier mobility in that region and does not teach nor suggest use of such impurity implant to perform a blocking function, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

However, since Xiang clearly teaches implants carbon, the neutral impurity, into the strained layer is the same as that of the instant invention. Therefore, the **effect or result** is the same.

Applicant further adds:

1. Xiang does not teaches nor suggest such impurity implants to perform a blocking function.

However, it is noted that “products of identical chemical composition can not have mutually exclusive properties”. A chemical composition and its properties are inseparable. Therefore, if the prior art teaches an identical structure, the properties which presently discloses and/or claims are necessarily present. *In re Spada*, 15 USPQ 2d 1655, 1658 (Fed. Cir. 1990). In this case, the semiconductor structure of Xiang, in view of Noda, comprises a similar

structure, e.g., the strained layer being implanted with a neutral species, (Xiang), or In, Sb (in view of Noda), therefore, the semiconductor structure of Xiang, in view of Noda, should inherently have the same “blocking function” as claimed.

Regarding the term “misfit dislocations or crystal defects along an interface”, as shown in the prior art, Figs. 1a-b, [0002], the misfit dislocation is inherently formed at the interface between the strained layer and the relaxed layer.

2. Xiang does not teach impurity of In, Pb, Sb and Sn.

However, in view of Noda, In and Sb are well known in the art to be used for blocking the diffusion of ions from the source/drain regions into the channel, e.g., punch through.

3. Xiang’s and Noda’s teaching of use of halo region is not suggestive of the inventive implantation of impurity dopant material selected from the group comprising: In, Pb, Sb and Sn, that partially or fully occupies each said one or more threading dislocation....

However, according to the specification, the blocking impurity doping is inherently resulted in partially or fully occupies the threading dislocation, misfit dislocation or crystal defects along the interface between the strained layer and the substrate. Or another word, the impurity will occupy the dislocation region by simply implanting the impurity into the substrate.

Therefore, regardless of the intended purpose of Xiang, the implantation of the neutral impurity of Xiang into the strained layer of semiconductor material should inherently result in the impurity dopant partially or fully occupies each one or more threading dislocation or crystal defects along the interface.

Since claim 1 is unpatentable over Xiang in view of Noda, claims 2 and 4-9, due to there dependency, are also unpatentable over the same references for the same reason.

The same also applies to claim 5 and 6 as well.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anh D. Mai/  
Primary Examiner, Art Unit 2814